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THE
CACAO PLANTERS'
❧ MANUAL ❧

BY

E. J. BARTELINK.

Cacao-Planter at Paramaribo.

Translated by H. J. VOGIN from „De Indische Mercur”.

ENTERED AT STATIONER'S HALL.

LONDON. — KIRKLAND, COPE & Co.,

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Cacao Planters' Manual.

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P R E F A C E.

Among the agricultural products which have of late years made rapid strides on the domain of industry and manufacture, the *cacao*, generally called and written *cocoa*¹⁾, the chief ingredient of chocolate, holds a distinguished place. This article is becoming more and more general as a popular beverage and wholesome food, and thus notwithstanding the increasing production, the consumption holds the balance sufficiently to prevent any serious decline in price.

There is surely no agricultural production that requires more care, trouble, patience, perseverance and outlay, than the cacao, but against this it may be stated that, in case of success, no product can be mentioned that yields greater profits, while these will go on increasing prodigiously from year to year. It is a fact, — and of this there are abundant proofs, — that in Surinam Cacao-plantations exist, each representing by itself an immense fortune, and which descending as an heirloom from

¹⁾ It is very much to be regretted that this spelling and pronunciation obtains in English to the exclusion of the more correct *Cacao* (*Theobroma cacao*), the more so, as it thus becomes hopelessly confounded with the *cocos nucifera*, which we also call *cocoa-nut*. I shall take the liberty of adopting the more correct *cacao* in this article. (THE TRANSLATOR.)

VI.

generation to generation, after a long course of years with constant good care, have not only not lost a jot of their original value, but have rather increased in productiveness.

It is of the utmost importance for the cacao-planter, if he would succeed in his enterprize, to have a guide to go by and rule his proceedings.

The present work is intended to explain by a number of experiences gained from long practice and intimacy with the subject, all that bears upon the culture of the cacao-tree, what must be done or avoided, what enemies the plant has to contend with from its very germ, what preservatives and what measures of precaution must be taken, in a word, to trace the cacao from its very birth through all its stages, till it is ready for the market and for our use. The reader will also find many hints and instructions concerning the planting of cacao.

The third part can be regarded more as an Appendix, and contains mainly a description of the manner of embanking the land; the excavations to be made for that purpose, the construction of a discharge conduit, the necessary buildings required by every plantation, and finally a statement of the Cacao production in the Colony of Surinam, as far as regards the cast five years; to which is added an estimate of the cost of embanking 500 acres of land, and the expenses attending the laying out of the first 15 acres.

E. J. BARTELINK.

Paramaribo, December 1st 1884.

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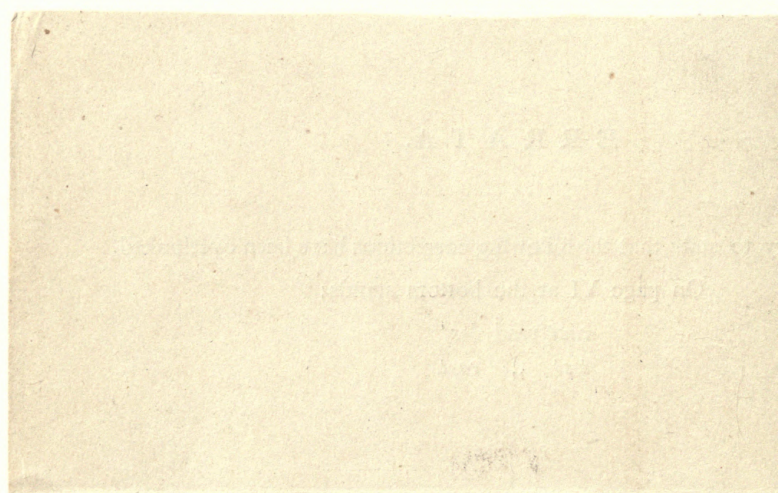
ERRATA.

We are sorry to state that the following corrections have been overlooked.

On page VI at the bottom stands:

cast read *last*.

test „ *cost*.



FIRST PART.

The Cacao-Tree, its Growth and Culture.

The Cacao-Tree.

The Cacao (*Theobroma Cacao* L.) belongs to the family of the Buttneriaceae and is a native of the tropical regions of America, though now found also in many parts of Asia and Africa. It is said that hitherto the best sorts of cacao come to us from the coasts of Caracas. The cacao-tree, under proper care, attains to a very high age and increases annually in productiveness. Wild, or when neglected, it dies away earlier, as will be described later on. The stem sometimes grows to the height of 10 M.; the bark is of a silvery brown; the young leaves, of a purplish tint, deepening in time to a dark green; they have a short petiole, are oblong, tapering, entire, and provided with deciduous, setaceous stipules. The flowers proceed from the branches and stem in close furcated clusters, outside the axil; they are hermaphrodital, regular (actinomorphic), and consist of 5 lanceolate pink sepals, 5 petals with a cup-shaped unguis, a spatulate, dentated blade, and 10 stamens (5 true and 5 false) united below into a broad membranous ring; the fertile ones are short and topped with a four-celled anther, the sterile ones appear as slender subulate lobes.

The ovary is superous, five-celled, bears 1 style with 5 stigmas, and has in each part 2 rows of ovules. The mature fruits, which are not by far so numerous as the flowers were,

are much like the fruit of the *Citrus medica* Risso, which produces our candied lemonpeel, and grow to the size of $1\frac{1}{2}$ decim. long and $7\frac{1}{2}$ centim. thick, bear 10 longitudinal ribs, and when fresh are of a yellow, orange, or red colour, but when dry, brown. The fruit-wall, by nature pulpy, dries up hard. In each fruit there are 5 or more vertical rows of flat, bean-shaped seeds, sometimes as many as 60 in number.

The first notable attempt at Cacao planting in Surinam dates from the year 1733, more than a century and a half ago. After many vicissitudes it appears not to have become a staple production of the colony till the beginning of the present century; and even now the cacao is not by far what it could be for Surinam, considering the fertility of the soil, and its admirable fitness for the cacao culture.

The constituents of West Indian Cacao are:

Cacao-fat or butter	43	to	53	p.cent.
Albumen	13			»
Starch	10	»	18	»
Water	5	»	6	»
Mineral matter	3.5	»	3.8	»
Theobromine	1.5			»
Sugar.	0.5			»

long with slight traces of colouring matter.

Several periodicals in different countries having of late years applied to the describing of the cacao-tree and fruit, the present writer is induced to confine himself more especially to the culture and the preparation of this very useful and profitable product, in the hopes that cacao planters and manufacturers may derive some use and profit from the perusal.

Situation of Surinam.

Surinam is situate between 6° 2' N. L. and 57° 54' W. L. from Greenwich, and enjoys therefore a climate agreeing in every respect with that of Trinidad, Curaçao, Venezuela, etc.; Surinam might even be placed above many other countries in this respect.

The same can be said of a great of part the Netherland East Indies. Nor can it be denied that countries lying in like longitudes and latitudes, and with like soils and climates, must yield like productions, whence Java and many other islands of the Indian Archipelago must be very fit for the culture of the cacao.

The soil of Surinam is all that is required for the cacao-culture, more especially the lands lying higher up the rivers, as these enjoy the double advantage of being protected from high winds by dense forests, and of being constantly supplied with fresh water by the abundant streams and rivulets. The lower parts being more exposed to the influences of bleak sea-winds and the intrusion of salt water, offer more difficulties, which, however, with proper care on the planter's side, are by no means insurmountable.

The Soil.

• The cacao-tree thrives luxuriantly in a loose clayey soil. The stratum of peat, which in some localities covers the earth to the depth of a few feet, is, more than any other manuring, favourable to the tree. Only the young cacao-trees have, in the rich peat-soil in times of drought, much to suffer from the broiling heat which the peat absorbs from the sun. These young trees must then be protected by piling up a good deal of earth at the foot of the stems, and covering this with a thick layer of dried grass, which will preserve moisture and coolness.

It is, however, advisable, before planting the cacao-tree in a peat-soil, to dig the soil deep, turning the clay up on the surface and the peat under. This is a good preservative against the heating of the ground.

Salt water is undeniably a great enemy to the cacao-tree. Directly the roots come in contact with salt water, the tree languishes and soon perishes. An instance of this was seen on a certain plantation, where, during an intense drought, the salt water broke through the banks inundating ten fields

(429 H.A.). The trees there never again produced fruit as before, and died one after another.

Thus the advantages presented by the uplands are: first of all, the presence at all times of sweet-water; secondly, the nonprevalence in those altitudes of the injurious, chilly night-winds; thirdly, the impossibility of the earth there absorbing briny water by suction; and fourthly, that in those parts the ground does not increase so quickly, by which the digging out need not be repeated so often.

In *soured* land — i. e., where by some cause or other the water has become stagnant — the condition of the trees is improved by digging up the ground at a distance of 18 decim. round the stem, strewing in it a pound of ordinary mortar or three table-spoonfulls of sugar-lime, and closing up the opening with mould. This produces an ordinary chemical process, the lime absorbing the acid and being afterwards dissolved. If in digging this circle a bit of root is in the way, great care must be taken not to injure it, but rather to make a little deviation and circumvent it.

The Cacao-Fruit.

The cacao-fruit is about the size of a small melon, has ten ribs and is of a reddish yellow colour. The Caracas sort is red. On opening the capsule there are 5—8 rows of white seeds each like a full grown almond, lying equally over each other, and attached to a common central spindle. Each bean rests in a thin pulpy integument, which is of a sweetish sour taste, and that can be sucked off, when a brown bean remains. This bean dried and worked is our Cocoa, or cocoa nibs, known all over the world.

The Surinam cacao is the ordinary yellow sort, and is planted everywhere. In a Cacao-field many different varieties of Cacao, sometimes even as many as twenty, are found. The best sort, however is the so called Porcelain Cacao, distinguished by a thin, smooth shell, and the fullness of its beans.

Then you have the Male Cacao-tree. This distinguishes itself by constantly producing a quantity of blossoms, and very few (at most 3 à 4) fruits. These fruits, if they do come to maturity at all, only contain as a rule 2 or 3 small beans.

Fortunately this species is very rare, one tree only occurring within an area of twenty acres. The red Caracas sort is rarer than the ordinary yellow sort. The difference between these two is considerable. The Caracas sort shoots up more vigorously and luxuriantly, displays more growth, flourishes more exuberantly.

rantly and bears a greater quantity of fruit than the indigenous species; it bears also much better the vicissitudes of the seasons. Caracas-cacao long preserves its properties in fields where it is planted alone: but planted between the indigenous, it degenerates and assumes the properties of the common sort. The first seeds of Caracas cacao were brought hither by the Governor R. F. Van Raders in 1845 or 46, so not more than 40 years ago.

Shade.

The cacao-tree will only grow in the shade of other and larger trees. As now a cacao-field before planting is one nude area, it is necessary at the first planting to provide for the shade at the same time. For this purpose auxiliary shrubbery is used, i. e. such trees or shrubs as grow very quickly but never reach to any considerable height, such as cotton-trees, cassava, *tayers*. Meanwhile the Bananas which are planted along with cacao-trees grow up, to make way at last for the shade-tree proper, the protector of the cacao.

Shade-Trees.

The shade-tree (*Erythrina indica*) is called here (in Surinam) Coffee mamma, probably because in former times, when Surinam cultivated great quantities of coffee, it served the same purpose for the coffee-tree as it now does for the cacao-tree. On planting this shade-tree, select young healthy slips and set them in the ground. With careful nursing this plant will grow up with astonishing rapidity and yield an extensive shade. In cutting the slips from the large shade-trees, try to cut a part of the stem with it. A careful selection is the first consideration. Seeds also can be used for planting.

We distinguish two sorts of shade-trees (Coffee-Mamma), the white and the red. The first is the most recommendable and generally preferred, as it strikes root soonest and grows more rapidly. The length of the slips must be from 2 to 2½ M. as they then become trees much sooner. They must be firmly and deeply planted, on account of their putting forth leaves first at the top, and so would be apt to be blown down, if not sufficiently deep. The end of the dry season (the beginning of November) is the best time to plant the slips, that they may have the advantage of the early rains; the lower sprigs must be cut away to make the slips shoot up the sooner and become trees. Keep them well clear, too, from weeds and creepers.

The Planting of the Cacao-Tree.

The time for planting begins in the months of May and June, December and January after the short and long dry-season.

This planting is done in two ways: 1°. by putting the cacao-beans in the ground, 2°. by means of young plants previously nurtured for the purpose.

Everything depends on this planting, and it is a business that must be attended to with the greatest attention. Choose therefore efficient workmen of good conduct, and on whose carefulness you can rely, since the success of the young plantation depends entirely upon them.

If you plant with beans, you must proceed as follows: First loosen the soil to a depth of 2 to 3 centim.; then put in the beans flat, having first washed them well to remove the sweets, which would attract the insects, and stirred them in lime to keep off the insects and to promote the looseness of the soil. Then cover them lightly with earth to prevent their being driven into the ground by the rain, which frequently happens even in heavy compact clay. The beans develope sooner than young plants from the nursery, but they are more exposed to destruc-

tion by insects that are in the ground attacking both the bean and the germinating plant. Ten days or a fortnight after being planted, the beans germinate and appear above the ground.

Planting with young plants from the nursery is preferable. The nursery must be in a cool and shady part of a field and laid out in beds (nursery beds); the plants are reared from beans planted at intervals of 25 to 30 cM. This distance must be observed in order not to injure the tender plants when removing them. The soil of these beds must be previously well turned up and made as loose as possible. Within six or seven weeks the young trees are formed. Now they are dug up with a good clod of earth, and planted in the plantation in holes made beforehand, where they are left to grow. The clod around the root must be at least 25 to 30 cM. in circumference.

A prime recommendation in this work is care. If the taproot protrudes a little beyond the clod, you may cut it off with a sharp knife; if, however, it projects too far, then you had better make a deeper hole with a pointed stick so as to allow the taproot to go in as in a sheath. But take especial care to stick the taproot straight and upright into the ground, not to bend it crooked. The safest way, however, in digging up the young plants, is to leave so much earth about the roots that they remain quite covered and invisible, while further the opening must be well filled up again to prevent the rain-water from filling the hole, and thus killing the tender plant that can bear little moisture.

Young plants can also be reared in small baskets, which in

the planting-season may be committed, basket and all, into the holes provided for their reception. These baskets are woven very loosely, filled with rich mould, and the bean planted therein. The lightness of the basket-work promotes the penetration of the moisture, and thus the decay of the basket. Bamboo is also sometimes used for this purpose, but this is less advisable, partly because the young plant has no space to grow, and partly because the bamboo will not rot so soon in the earth. In the shade of a wide-branched tree these baskets can be held ready by hundreds at a time to use them as they are wanted. In planting cacao in these baskets, you must be mindful, that in the dry season the earth cracks, by which the baskets stand isolated and so can be lifted loose out of the planting hole. This can be prevented by timely adding good earth upon the baskets and round the plant.

A good precaution in planting out nursery trees, is at the same time to put three cacao beans into the ground round the young plant, that if the plant itself should not thrive, there be still a chance of one or two of these beans succeeding. If they both succeed well, then these young plants can again be rendered serviceable for filling up vacant places, or to replace betimes any sickly or languishing plants.

To prevent the ground cracking near the young Cacao-trees, it is necessary, before the drought sets in, to dig up the soil thoroughly, to earth up the plant and put dry weed round the stem.

The Burning.

The burning of the ground preparatory to planting is advocated by many, and denounced by others. The following rule is proved by experience to hold good. On rich peat ground it is not necessary to burn, if seedlings are used for planting. By the relatively considerable depth that they require, the plant penetrates through the layer of peat and comes in contact with the clay subsoil, in which they soon throw out roots and grow luxuriantly. If, however, beans are used for planting, a little burning is not amiss, without however making the ground too hard. Especially in the dry season, the peat retains a good deal of solar heat, which would scorch or sear the tender plants.

The advocates of strong burning adduce as motive, that if all the best and greatest part of the humus is lost by burning, the ash that remains fertilizes the soil with a new principle (soda?) and the fire destroys, in a great measure, the insects that harbour underground. The writer of the present has strong objections to burning, and an experience of five and twenty years only confirms him in this conviction.

Manuring.

The cacao-tree requires no manuring. The dead leaves, the number of caterpillars falling at certain times from the shade-trees and dying, the empty pods left on the ground after collecting the fruits, give a rich and abundant manuring to the soil. Some experiments have proved that in dry and barren ground Guano is also a very good manure for cacao.

On heavy clay-land the spots that are to be occupied by the young cacao-plants must be dug up in the dry season. Very poor soils must be manured shortly before the rains.

This preparation renders the soil loose and friable, and the manure is already decayed when the young trees are put into the ground, by which the roots from their beginning derive the necessary nourishment for their development. Old, decayed cow-dung mixed with rich mould — each one half — gives an excellent manure.

This digging up and manuring takes place in the month of October. The soil is then exposed to the influence of the sun, which renders it soft and loose, kills the insects therein, and partly burns up the tender weeds. This hardness or closeness of the ground, added to the weeds covering the earth in the rainy season, are apt to prevent the rain's penetrating. This is remedied by proper manuring and loosening of the soil.

Handling and Pruning of the Cacao-Tree.

As soon as the Cacao-tree can be regarded as safe, the handling is commenced with. This handling must be so managed as to cut away the many branches and to leave only 3 or 4 healthy main branches on the stem to constitute the future tree.

In this manner the ground is covered as far as possible, without the trees injuring each other or preventing the free admission of light and air. One peculiarity of the cacao-tree is that it shoots a multitude of branches, and this is detrimental to its fruit-bearing powers. Therefore a good tree must not be too thickly branched or leaved. These two drawbacks combine to exclude light and air, so indispensable for the life of the tree. A cacao-tree trimmed on one stem, lives longest, grows best and bears most fruit. The leaves, which along with the roots, must nourish the plant, may in most cases be so rich and close, that they rather injure the tree, by impeding the free play of light and air through the branches.

It is, therefore, of the greatest importance to prune the tree properly. The first three or four straight upshooting branches are the most fertile, and once reduced to that number, care must be taken to keep it so.

Where much is to be pruned away, is generally the fault of the planter. If the tree shoots up too high, the branches must be topped, partly to confine the business of pruning, and partly to avoid too troublesome a height for the gathering of the crop. Keep the tree, then, at a constant height of 4 or 5 Metres, this being the most convenient for the clearing and plucking of the fruit.

The branches and suckers should always be cut from below upwards, with a sharp instrument, as the cacao wood is very apt to split. They should be cut off smoothly, equally, and as close as possible to the stem, the wound will then heal sooner and not be so subject to the attacks of wood-lice or other noxious insects. Some old planters recommend a mixture of pitch and linseed oil, boiled up together to a doughy consistence, to cure the wound withal. Experiments made with this have proved satisfactory.

Suckers are peculiar shoots put forth by the tree as a natural consequence of its exuberant action. The less a tree produces them, the less vigour and power of development the tree itself possesses. These suckers are more abundant in the rainy season, growing on with the tree in that period; in the dry season — the resting time of the trees — they occur less frequently. As these suckers absorb much of the vital saps of the trees, they are positively injurious, and should at all times be removed from the stem by pruning. They are distinguishable by their soft consistence and light colour. One service these suckers sometimes perform; namely, when it is desirable to rejuvenate a senile tree. The old tree must then be cut down just above

these suckers, as close as possible to the ground; and with a careful handling these suckers put forth branches and become themselves the tree.

The fruit-bearing power of such a tree, however, never equals that of the parent tree; indeed it can only be regarded as a shift to keep a good cacao-field complete.

Pruning time,

The months of September and October are, with a view to the November rains, the fit season for pruning.

Weeding.

Weeding must be attended to constantly as the weeds grow up. The chief care of the planter must be: never to allow any weeds to grow up on his cacao estates. They are, too, a pest to the young trees; these especially must be at all times kept entirely free from them. The state of the ground will readily show whether the estate must be weeded in August and September. On sandy soil, weed between the trees, but let the weeds stand round the stems. On clay ground, on the contrary, weed round the stems, and leave the weeds between the stems. In the first case the abundant dew effects an aspersing process, and in the second a filtering and percolating process. The genial rains in the month of November ought never to find weeds on the estate. The pruning, clearing, weeding, and the removing of the suckers, should all be done before that time, in order that the tree, and the tree alone, may derive the advantage of the rains.

Clearing of the Trees.

The clearing of the cacao-trees is never at an end; at all times the tree must be kept free from creepers, parasites, insects, dead wood, etc. Dead wood is an attraction to insects, especially to woodlice; it also imparts too much moisture to the tree in the rainy season.

The creepers which act highly injuriously on the cacao-tree, are the *Acrocarpidium Nummularifolium* Miquel (called in Surinam dritibri wiwirie), which by its thickness, especially on aged trees, prevents the opening of the blossoms, and the bird parasite, which proceeds from the excrements of birds, and for that reason are called in this country *vogeldrek* (bird-muck). In the trees, not entirely shaded, it attaches itself to the branches and tops, entwines the tree, causes it to suffer greatly by absorbing all the vital saps, and finally kills it. It is superfluous to repeat that good and expert labourers must be employed for the clearing of the tree.

The Bearing of the Trees.

The cacao-tree does not, like other trees, bear its fruit in clusters or bunches, or on stalks, like grapes, mangoes, etc.; it is from the tree itself and from the thicker part of the branches that the blossoms come forth, and after their fall the young fruits are seen attached to and along the stem and branches. A short stalk connects the fruit with the tree, so that at the gathering the fruit has only to be twisted round a few turns to get it loose. The fruit hanging beyond reach must be cut off with a sharp gathering hook.

In its fourth year the cacao-tree begins to bear fruit and then continues uninterruptedly.

The greatest fertility prevails from its 12th to 25th year. With careful treatment, however, the tree can be made productive till its 50th year, and even longer; such old trees are, in a regular season, not inferior in fertility to younger ones, even of half their age. Not all cacao-fields are equally productive; in one and the same plantation it often appears that one field is much more productive than another. The cause of this may be: better and more fertile land on that spot, or an unexpected shower of rain discharging itself on a part of the fields. This settles the question why one plantation should be more productive than another.

Enemies to the Cacao-Tree.

The enemies to the cacao-tree are:

1°. *Continuous winds*, which are highly injurious. The more the trees stand exposed to the wind, the more poorly they look. Experience has shown in all plantations, that whole rows of cacao-trees, that caught the most wind, perished; where they remained standing they looked poor and languishing. To prevent this, it is necessary to have wind-breakers, that is: on the chief beds the shade-trees must be planted closer, so that the thick foliage may diminish or break the force of the wind.

2°. *The salt-water*, which alone is sufficient to destroy a flourishing plantation (this has already been mentioned above). The cacao-planter must then be forewarned to be especially on his guard against this formidable element.

3°. *The creepers, or volubilate plants*, which have already been spoken of.

4°. *The Insects*. These are for the kernels: the ants, and for the tender plants: the koti- kotis (a kind of cock-chafers or scarrabaeus) called by Teenstra *veenmol* (*mole-cricket*.)

Large trees are much infested by tree-ants, wood lice and beetles. Ants in the ground are found all the year round; mole-crickets most in the rainy season, because planting is then going on, and beetles most in the dry seasons. These beetles bore an opening into the bark and deposit their eggs there, which soon become caterpillars and commit great ravages on the trees, by devouring everything, from the bark to the very core; they then change to grubs, till by further metamorphosis they break forth as beetles and fly away to continue their devastations elsewhere. Young trees are most infested by beetles, and consequently suffer the most, languish and perish. An indication of the presence of caterpillars in a tree is, that here and there a white slimy moisture shows itself on the bark; — as the caterpillars grow in size, a kind of dust, like saw-dust, is discovered on several parts of the tree; a consequence of the insect's boring into the wood.

The worms, or caterpillars, as soon as discovered must be cut out with a pointed knife; if they have penetrated very deep, stick a long sharp bodkin into the hole or cell, and twist it round several times in order to kill the insect, after which thrust a little wadding steeped into a solution of purified carbolic-acid into the opening. Purified carbolic acid can always be applied with success wherever caterpillars or beetles have been removed. Besides the way prescribed, you can also besmear the tree with this solution with a brush.

As the destruction of these beetles or caterpillars calls for great perseverance, attention and especially patience, some fit and reliable labourers, in proportion to the extent of the

estate, must be employed daily at this work in every plantation. The less bark you cut away, the sooner the wound will heal.

These beetles or caterpillars are, as it were, peculiar to the cacao-tree. As early as 1804 we find, in a work published by the Planter's Union "de Eensgezindheid" in the division Matappica, these beetles made mention of.

It has been perceived of late that, in the young plantations many tender trees perish without any apparent cause. If, however, you dig up such a tree, you will see that the beetles have attacked the tree from below, and eaten into the very core. Such a tree is irretrievably lost. Unfortunately this evil cannot be prevented or remedied.

Then you have the large red caterpillar haunting the shade-trees, and coming forth later on from the pupa as a grey evening moth. These caterpillars are occasionally so plentiful, that in the morning they are found lying under the trees by thousands, where they die, causing a nauseous smell, but at the same time enriching the soil as manure. The evil they do is: eating away the verdure of the cacao-tree. It is true the tree does not die of it, but the time that it requires to put forth fresh leaves again, it is at a stand still, and calls for more vigorous exertions in the tree. The only way to drive these caterpillars from the cacao-tree is to beat them off.

Of late, too, another species of beetle has been discovered, having short wing-cases, and covered with bright yellow spots. These fall in swarms upon cacao-leaves and devour them entirely, producing the same evil as above described.

The cacao-lice are vermin equally troublesome, that appear

on the tender fruit as small black spots. They injure the outer covering of the young cacao-fruit, by which they do not reach to maturity, and if they do, they are very poor and small, while the beans, by imperfect maturity, are white on the breach.

Tree-ants occasionally cover a part of the stem, or a whole branch, building there a large nest. In the rainy season you must try to destroy them by firing the nest, taking good care, however, that the fire do not extend to the tree. Sometimes a bucket or tub filled with kerosine oil is placed close to the nest, which is then wrenched off and dropped into the tub, and the oil immediately set on fire. In this manner with a little dexterity the ants are sure not to escape. Ants' nests in the ground are destroyed by means of water. The nest is first filled with water, you then stir it up till it becomes a pool of mud; and doing this three or four days successively will destroy all the ants. It is, of course, a necessity to have a plentiful supply of water at hand for this purpose.

Sulphide of carbon (CS_2) which can be had of any chemist, can also be used to exterminate ants, but their destruction by means of water is much the best way.

Nests of woodlice are found in all the cacao-fields. It has been computed that one tree in a hundred bears a nest of woodlice. In some fields they are rarer, in others there are none at all. The only way to destroy them is poisoning by arsenic or sublimate. The poison is simply strewed over the nest; this does not kill all the immates, as a part of them emigrate to other trees, but it is proved experimentally that a tree, in which a nest has once been poisoned, remains for years preserved

from further attacks of woodlice. The damage caused by these woodlice is relative. The nest is generally laid in the junction of two branches (V shaped, or forked). As the nest becomes larger and heavier, the boughs bend, and at last split asunder which makes the bark assume an unhealthy light yellow colour, and causes the tree to languish and perish. Continual perseverance and uninterrupted persecution of the insects in a plantation diminishes obviously their numbers, though it does not cause their entire disappearance.

General Observations.

It is no uncommon phenomenon, that the cacao-beetles, or caterpillars, do more damage in one plantation than in another. The cause may be local, as: the presence of many young trees, lack of labourers or of pecuniary means to continue the persecution uninterruptedly, or sometimes the indifference or negligence of the planter.

In one bed, in the same field, at a small distance of 16 or 18 feet from each other, two cacao-trees may be often seen, the one in full growth and bloom, the other backward and stunted. The causes of this may be:

1°. that the earth on that spot is too close packed (heavy clayey soil), and suffers too much from the sun, making it as hard as stone, so that in the rainy season the water cannot penetrate, but remains on the surface;

2°. that the tree is insufficiently shaded;

3°. that the taproot in planting has been bent crooked, and lacks the power to shoot vertically downwards, a — circumstance which will always make such a tree pine away.

In the first case the looseness and porosity of the ground must be promoted by applying lime, as has been said above, in the second case additional shade must be provided. If, in spite of these trials, the tree remains in a languishing state, it must be dug out and the roots must be further examined.

The Flourishing and Bearing of the Trees.

The cacao-tree bears blossoms the whole year round, except in the dry season. The months of November and December are considered the real blossoming months; then follow June and July, but these are of less significance. The first showers succeeding the dry season generally produce blossoms in eight days. Yet all these blossoms are not productive of fruit (about 10 % in the mean). The bleak chilly south wind (land-wind) blights a great part; there is hardly any or no fertilization, or else the fruit already set harden on the stem and blacken. Full-grown Cacao-nuts are also frequently apt to harder. This takes place when persistent heavy rains set in too soon after a very dry season. Herein nature exhibits a marvellous provision, for if all the blossoms formed fruit, the tree would be prematurely exhausted and very short lived. The development from blossom to fruitlet takes place in two days and nights. In four or five months hence the fruit is full-grown, mature and fit for gathering.

It is most advisable in laying out new cacao-fields to

procure beans for planting from some other district. In this manner the nature of the trees is improved by crossing, and there is an opportunity for observations and comparisons. One acre (0.429 H. A.) must hold about 200 cacao-trees, planted at intervals of 5 M. from each other and plentifully shaded. It is an accepted maxim: little or no shade, few or no cacao-trees. The shade-trees are to be planted at 20 or 23 M. distance in connection. As in course of time these trees grow to a great size, care must be taken that they do not over shade the field, which would again be detrimental. The main thing is to plant in the middle of the beds, far enough from the extremities to prevent the roots getting in the drains or trenches. They must spread high and wide like an umbrella over the cacao-trees.

Young cacao-trees must be earthed up to their third year. This is very promotive of their growth.

Bananas.

Before terminating this First Part, it is necessary to devote a few lines to the Bananas, that profitable and indispensable by-product of every cacao-plantation.

The Banana (*Musa Paradisiaca*) is in this colony the chief article of food. Besides the utility derived from it as an auxiliary shade, this tree, in a favourable season and under ordinary circumstances, contributes in a great measure to defray a part of the expenses attending the laying out of a cacao-plantation. Every young cacao-plantation begins at the same time with Bananas, and if you have the good fortune to hit upon good cropholding banana-land, you will soon at very little expense come into the possession of luxuriant, flourishing cacao-fields.

Fields in which the cacao will not take root, on account of the Bananas being blown down, had better be planted with Bacoves as auxiliary shade. The stem of the Bacove has a much greater compass than the Banana by the sprouts shooting up around it from the ground. It is not so subject to be blown down, as it roots much more sturdily, gives more coolness, and grows capitally where the ordinary Banana will not or cannot grow. It is true that, contrary to the Banana, the Bacove yields no profit, but the advantage that the young cacao-plants enjoy from them, is a full compensation.

SECOND PART.

The Cacao-Fruit and its Preparation.

The Gathering of the Cacao.

The gathering of the cacao takes place in the field and is the first process to be attended to. The nut or fruit is ripe when it has assumed a deep orange colour. You twist or knock off the ripe nut, break it open on the spot and take out the contents. The empty shells are left in heaps on the field to rot and then serve as manure. The fresh cacao is collected in baskets, hampers, coops and all kinds of vessels, and carried by the labourers from the field to the sheds to be there measured, in order to calculate the wages earned. This measuring is done in a tray arranged for the purpose, and gives the manager at the same time a standard for his estimates. If the trees bear profusely, an able labourer can gather daily 80 or 100 kilogr. for which he is paid 2 cents per kilo. ¹⁾

To the gathering succeeds immediately:

¹⁾ On less favourable occasions the workmen are paid day-work.

The Fermentation or Sweating.

The wet cacao is put to exude in a kind of stove or hot-house. Such a stove is partitioned off in boxes or little rooms and must be closed as tightly as possible against the penetration of the outward air.

The floor must be of planks provided with holes to carry off the juice of the fruit. A stone floor is not advisable, because the cacao-juice would find no vent, and the beans, too, by getting into the joints would break, might spoil and get hard by remaining partially in the moisture. The cacao must be heaped up in the stove, and turned over every 24 hours to obtain a regular sweating. If, however, this can be done twice in the 24 hours, so much the better, for, the more lightly and loosely the cacao lies, the more easily the sweating goes on, by which the slimy

moisture in the bean detaches itself easily. — After two days and nights, the cacao is taken from the stove and exposed to the heat of the sun upon a stone floor, where it is turned every quarter of an hour, as otherwise the beans would draw too much heat on one side from the stones.

The first two days the cacao must lie only a couple of hours on the drying floor, that being so fresh it may not bake at once too much, but that the drying may proceed gently and by degrees. — The third and fourth day it must remain there the whole day, but incessantly turned, for the cacao not be scorched or cracked by the heat of the sun and stones combined. — After this it must be carried to the shed-lofts, where it is further dried by exposure for 8 to 10 days to the free play of the wind, taking care to turn them twice a day to keep off the insects. This being done the cacao is ready for packing and delivery.

Some very good, productive plantations are without sweating-houses, but the cacao is sweated in large heaps in the sheds below. The sweating in separate hot-houses is much preferable, because the complete exclusion of the outer air preserves the aroma of the cacao, while by sweating in heaps, the upper layer suffers too much from the outer air, which acts upon it as a cooler, dispels the aroma, and renders the sweating less equal. Besides this the exhalations arising from these heaps mount further up into the loft, and finding there no escape, precipitate and act very injuriously upon the half dried cacao in the shed, covering it with moisture.

Such cacao as is not considered sufficiently dry to be carried to the loft, must be laid in heaps in the lower shed; this will

occasion another slight heating or sweating, and makes the beans swell better. Yet these heaps should again be turned, two or three hours after they have been removed from the sun into the sheds, that they may not sweat too much and become musty. If the cacao has had a blazing sun in the drying house and this turning be neglected, the cacao is apt to begin sweating immediately.

The cacao first gathered is generally allowed to sweat one day longer, because the stove or hothouse, when thoroughly cleaned and aired after its previous use, does not promote fermentation and therefore the proper exudation required for the cacao. ¹⁾

¹⁾ When the trees bear very abundantly, especially in view of the inconstancy of the weather, it is advisable to chop off the ripe nuts from the trees, to let them lie in heaps on the beds in the field, and not to break them open till three or four days after. In this manner the beans absorb to themselves the greater part of their juices, improve thus in quality, undergo a natural heating, and require less sun for drying. Such beans are consequently the best for planting.

This way is also more profitable for the measuring of the labour, as in the usual way there is much refuse in the freshly gathered cacao, while in the above way the measuring tub will hold more.

Good ripe cacao has less juice than the half ripe. In view of the advantage attached to this, the cacao should never be plucked but when perfectly ripe, so easily perceptible by its deep orange colour.

Cacao plucked unripe is much more difficult to dry and has besides an unpleasant bitter taste.

The following passage taken from »The commercial Plants'', by TH. CHRISTY, bearing on this same subject, may be interesting to the reader, and is therefore inserted by the publisher.

Cocoa is taken out of the pod and fermented with Plantain leaves in a heap, until it is thought to be ready, and no rule is followed; simply this fermentation is allowed to continue for days, it prevents the bean growing mouldy or soapy, kills the germ and improves the flavour. Although books have been written on the subject by Directors of Botanical Gardens, who understand Thermometers, yet it has not occurred to them to go into the planters' „Sweatinghouse," and take the temperature regularly while „one heap" was being cured. They give 140° F. (60° C.) as that most advantageous, but it should rise gradually to 122° Fah. (50° C.) When the temperature exceeds 60° C. there are no doubt produced aromatic substances which are bitter and disagreeable; what is wanted is the true flavour of the ripe fruit, and to obtain this 60° C. must not be exceeded.

„The sweating process gets rid of the pulp, softens the bitterness of the fresh beans, and gives them, when cured, that rich mahogany tint so much sought for by chocolate makers, and may briefly be described as follows: — The beans brought from the field are placed either in barrels, oblong boxes, or in a close room where they are packed closely together, covered with plantain leaves, and left hermetically closed for a period extending from four to seven days. The exact number of days will depend on the variety of the bean or quality of cacao desired. While thus shut up, a process of fermentation, fed by the saccharine matter in the pulp, takes place, which raises the temperature of the mass to about 140° F. = 60° C. During fermentation, carbonic acid is given off and some water. In wet weather care is taken that the temperature of the mass does not rise too high, as otherwise the beans would blacken. It is often necessary under these circumstances to open the cacao, and carefully stir it before it is returned to complete the fermenting process.

„It will be noticed that cacao can be sweated in small or large quantities. For settlers, a box or an ordinary barrel would answer the purpose perfectly."

The Drying of the Cacao.

When we speak of a drying house, you must imagine a large square area of masonry rather raised in the middle and declining a little on all sides. This area must be of an extent in proportion to the produce of the plantation; sometimes you will see two on one plantation, where the produce of cacao is exceedingly great.

At all times the precaution must be observed, when working the cacao, to have a set of labourers in or near the shed, who, as soon as the sky becomes overcast, can transport the cacao from the drying place into the shed.

Some plantations dry the cacao in large wooden vessels or trays on wheels over rails, that run from the doors of the shed to the open air. On the least appearance of rain, these full trays are pushed indoors, to be brought out again as soon as the shower is past. In the hurry of shovelling up the cacao, when drying on a stone floor, many beans are apt to split or break, and with the least moisture in the shed, or in the atmosphere, get mouldy. Hence the use of these trays is very commendable. A second advantage is, that much fewer workmen are required than for drying on the stone area, to which must be added, that you save the costs of picking out the broken or

split beans when you proceed to pack up, which would be quite unnecessary when using trays.

The drying ground might also be separated into shallow squares, in which the cacao, when laid out to dry, might be covered up on the least appearance of rain with galvanized iron plates or water-tight wooden covers, and when the rain ceased, be opened again.

In an open drying-area, one or more large awnings of well tarred sail-cloth, impervious to water, are indispensable. As soon as the first drops of rain appear, such an awning is spread over the cacao, if it cannot be brought in quickly enough. When the shower is past, you have only to remove the awning to have the full benefit of the sun again.

A single passing shower over the cacao, making it thoroughly wet, does not spoil it at all, on the contrary, it will improve the flavour and quality because the rain washes away all the acids, which the cacao would otherwise absorb. A long and heavy rain on half-dried cacao, however, causes a loss in weight, as the pulp, which is otherwise, when properly dried, included in the weight, washes clean away. The wet cacao, when fetched into the shed after such a shower, may, if there is not sufficient room for spreading it out, be heaped up on the floor; if the weather remains wet, such heaps must be turned over two or three times a day to prevent its turning mouldy. Dry cacao put in a damp place soon turns mouldy.

The cacao when warm from the sun should never be put at once into bags, as it soon begins to sweat by its own natural warmth.

Good dry cacao must be brittle, cool, and fresh to the touch.

Mouldy cacao can be made to resume its good natural colour by washing it in clean water, mixed with some lime-juice; — the proportion is 25 % to 75 % water. This, however, causes a diminution in weight.

Good cacao of beautiful appearance can be obtained by using a winnow, though the cacao may also be picked. This winnowed and picked cacao always fetches a few cents more per kilogram. ¹⁾

¹⁾ We know by experience, that in Lower Commewijne, the produce of the trees is very various, one year from another, so that to get at the annual product of a plantation, you must add up the produce of three successive years and take the average of that. In plantations, situated on rivers of sweet water, the annual difference is not so great by far.

THIRD PART.

*Embanking of New Land for Plantations
and other Particulars.*

Embanking of New Land.

You begin with the front bank that must keep out the outer or river-water.

At the inner side of the plantation you take a strip of 80 or 90 feet broad over the whole length weeded, felled and cleared, to lay upon it a bank 50 feet broad. In the middle of this you dig over the whole length a trench, ditch, or gulley three feet broad and of a proper depth; this is called the *blinder-trench*. After this you must examine carefully whether there are any stumps, blocks of wood, roots of old trees, etc. in the *blinder*, which would endanger the embankment at any time, and thus should be removed, either by chopping them away or grubbing them out. Now you dig a ditch or canal 12 feet in breadth by five in depth, which canal must serve for draining the bank and so furnish the necessary earth to raise the bank and fill the *blinder*. The first stratum of earth to the depth of one spade (12 inches) consists generally of spongy ground mixed with grass roots, etc. and must be thrown away as entirely worthless.

The second stratum is good clayey earth that is dug up, thrown into the *blinder* and well rammed down hard; the third stratum a spade deeper is treated in the same manner, and so you proceed until the *blinder* is all rammed down hard and filled

up the top, and the bank has attained the required height.

The solidity and strength of the bank depends on filling and ramming down the blinder well, and throwing constantly good clay upon good clay. On either side of the bank a part is dug out five feet broad and two feet deep, which ground must serve to work up the bank.

The top of the bank must be made neat and staunch, to prevent the rainwater from collecting and percolating; the sides of the bank, as also those of the trench, must slope to prevent erosions and promote the running off of the water.

Now follow the side lines or limits, the middle-path, and the back embankment, which must all be worked in the same manner. Along the side-lines or banks you must dig navigable trenches, which must in the first third of their length be 20 feet wide, the second third 16 feet, and the last third 12 feet wide, which will give the necessary ground for the formation of the banks. The mean breadth in superficies of a side-line-bank is 50 feet.

The back embankment requires on the outside a spacious fire-trench, which in case of fire in the woods, must keep off the fire from the grounds of the plantation; and inside, a catch-water drain, for the draining of the embankment; these two trenches furnish the earth required for the raising and formation of the embankment. The back embankment serves for keeping off the forest water during the heavy rainy seasons, and to preserve the plantation from inundation.

Whenever a plantation suffers from one or more of the sweet water banks bursting, the damage caused thereby is

considerable for the moment, but this is fully compensated for afterwards by the increased fertility of the soil, and the greater productiveness in the succeeding year. In several plantations this has been proved by experience.

The distribution of catch-water-drains and small trenches is arranged in such a manner that one runs or discharges itself into another, by which, at any given moment, the grounds may be entirely laid dry, and at another time be plentifully supplied with fresh water.

In a well shaded, well filled and complete Cacao-field good delving is indispensably requisite. The rainwater sinks through the ground of itself towards these delphs or drains, and does not remain in puddles upon the beds or *under* the stems of the trees, which would be very injurious to the Cacao-tree.

An ill-shaded or incomplete field, does not require the delving in the same measure, as, especially in continuous drought, this would do more harm than good, unless you have at disposal a plentiful supply of sweet water.

A useful counsel in laying out a cacao-plantation, is to proceed very gradually and not to wish to undertake too much at a time, lest adventitious circumstances, such as want of pecuniary means, or want of labour, should oblige you to suspend the work begun, and thereby suffer considerable loss, leaving what was done a dead loss. Every good Cacao plantation in the Colony was begun in this gradual manner, and proceeded with by degrees, till it afterwards shone forth as a flourishing plantation — a living memento of what can be achieved by perseverance and determination.

The Laying of a Sluice.

To lay an iron cylindrical sluice well, the level of the highest and lowest tide at spring-tide must first be accurately marked; the bedding for it to rest in must be dug to two feet below the level of the lowest tide. Here this level is 3.14 M. or 10 feet. At neap-tide the flood is always $\frac{3}{4}$ feet less high than at spring-tide, and the ebb or fall is also never so low.

At a depth of 36 inches below the surface of the ground the earth dug out is worked backwards and on either side to 24 in. banks, until the requisite depth of bedding is obtained. This manner of working must be observed that the weight of the ground dug out do not cause a sinking and crumbling of the sides of the embankment.

The cylinder must be put together on the bank as close as possible to the desired place; the openings at either end must be carefully closed water-tight.

By means of trestles placed across the bedding the cylinder is hoisted up with block and tackle to just over the spot where it will have to lie, and is then gently let down into it. On dry ground this operation is performed in the way

described, but if the sluice must be laid in a water-course, and that you can avail yourself of a sluice at front or behind, you can let in water and float the cylinder to its destination. To make it sink slowly and regularly upon its bedding, you must then first bore a few holes in the stops of the two openings, when it will fill wholly or partially with water and sink.

When the cylinder is once in place, the first requisite is to take care that it lies perfectly level, as otherwise the closing of the door will always be attended with some difficulty.

Though this work is mostly done in the dry season, it may happen, that by a sudden shower a quantity of water may flow under the sluice-cylinders already laid, and make them rise or shift. As a precaution it is advisable to prevent the cylinder's moving, when it is once fixed in its place and levelled, by driving on both sides of it strong piles into the ground, and above this upon the body of the cylinders lay cross beams, in such a manner as to secure it firmly and render it immoveable.

On throwing in the ground, care should be taken to spread the earth equally everywhere, that no unequal lumps may interfere and shove the cylinder aside.

The greatest care should be observed as to the water-tightness, and likewise in the placing of the cylinder, whether it be let down or floated. — The smallest inattention, a trifling neglect, may cause the sluice to plunge over, and it will cost hands full of money to restore it to its proper position.

As soon as all this is done properly, the back slide-valve and the front door, being a tankard-lid door, should be fitted in,

and right before the sluice, on the bank, a solid square frame should be constructed fitted with a wheel and axle to hold the chain that is hooked on the tankard-lid door to open and shut it.

It is advisable never to leave this door half open, or to let it open of itself by the pressure of the water inside, as on such occasions the water rushes out from the half-opened lid on both sides, and remains whirling, causing eddies and thus undermining the fencings, by which they will gradually sink and tumble down.

Before the mouth of the sluice, the bottom should be protected as much as possible by fragments of stone, boulders, etc., for the outstreaming water not to hollow out a depth there, which might gradually extend under and below the sluice, thus undermining it, and causing it to plunge forward, or swerve from its position, which might entail incalculable damage.

Instead of the above, a still better way is to secure the sluice fore and aft by a fence made of sheating-piles of boards firmly driven vertically into the ground, which must close quite tight to prevent crabs, etc. from piercing them.

All that precedes relates to iron cylinder sluices. If it is desired to lay down a wooden gutter sluice, then only the *bottom* should be nailed together on the ground, and then laid or dragged into the bed dug for its reception, then the uprights are fixed and crossed by transverse beams, and the three sides be tightly planked. The seams must be faced well with laths on the outside of the gutter against

which the earth is thrown up, to prevent the ground washing away. By proceeding thus all blocks, tackle and frames are dispensed with.

The last part of the work is the making of the fence and front and back of the sluice. This work should be done with the greatest caution and the best square timbers selected.

The standing timber-work is formed of upright beams firmly driven into the ground, with anchor-posts extending as far as possible over the bank and secured with smaller anchors. To get the proper depth for the fencing boards, these should be driven in upright, after having previously duly pointed them. You can then drive them as deep as you will and obtain a good stable work, much more durable than if the planks were nailed on horizontally. Then inside over each seam a two-inch lath is firmly nailed on, after which you fill up the earth and ram it well down.

Buildings.

The buildings on a Cacao Plantation are:

1^o. Labourers' dwellings.

a. for Immigrants. These must be built in conformity with regulations prescribed by law, and first submitted for approval to the local authorities.

b. for Creole Labourers. These are bound to no building rules, but should be so arranged as to answer the claims of hygiene.

2^o. A Manager's Dwelling.

3^o. An Hospital. As long as Creole Labour is exclusively employed, this is not wanted, as, in case of illness, such labourers are nursed at home. As soon, however, as immigrants work on the Plantation, it is an obligation to build an hospital, arranged as the law prescribes, and provided with every thing that the Colonial orders have stipulated as belonging to an hospital.

4^o. A Dwelling for one or more superintendants.

5^o. A Shed or Barn for storing the products.

6^o. A Fermentation House.

7^o. The necessary buildings for Manager, Superintendants, etc. It speaks of itself that an already existing, well ordered

plantation is in possession of all these buildings. But on beginning a new plantatation the most indispensable is first taken in hand, and the rest of the buildings are added by degrees, as the plantation increases in extent, productiveness and importance.

One great requisite — especially strictly attended to where Immigrants are employed — is good drink-water. Every Plantation should, in proportion to its population, be plentifully supplied with iron tanks, vessels, tubs or large cisterns of masonry for use of the labourers. Sometimes wells are dug, which produce very good water both for domestic use and for drinking. In this manner, with proper supervision, a sufficient quantity of rainwater will be constantly preserved in the reservoirs to supply the wants of the people, whenever by long or severe droughts the sources are dried up and a general want of water is felt.

Production.

In v. Gorkom's *O. I. Cultures, in Betrekking tot Handel en Nijverheid*, we read:

Imports in England were:

in 1877	16,976,467	£ of Cacao.
„ 1878	18,012,839	„ „ „
„ 1879	26,334,761	„ „ „
Together. . .	61,334,067	£

representing a value severally of

554,247	£
693,632	„
1,099,637	„

together 2,347,516 £ being equal to 28,170,192 guilders Dutch money.

The stock in entrepôts at Bordeaux was:

in 1875.	1,251,035	Kilogr.
„ 1876.	1,331,990	„
„ 1877.	2,047,718	„
„ 1878.	1,351,374	„
„ 1879.	931,116	„
„ 1880.	16,003,018	„

The Colony of Surinam has produced in the last five years successively:

in 1879	1,122,900 Kilogr.	
„ 1880.	939,899 ⁵	„
„ 1881.	1,670,053 ⁵	„
„ 1882.	1,237,707	„
„ 1883.	1,765,174 ⁵	„

making altogether a total of 6,735,824 kilogr. all which quantities found their way to foreign markets. It may be safely granted that the total Cacao production of Surinam is distributed over the Dutch, the English and the North-American Markets.

The home consumption is of little moment, and is even so trifling, that it is not even taken in account on the mass.

Approximative Estimate.

FOR EMBANKING 500 ACRES OF LAND WITH A BREADTH
OF 40 CHAINS.

40 Chains length and 2 Chains broad, felling, clearing an lopping, at the rate of 8 acres à florins 70 per acre	florins 560.— =	£ s. d. 46 13 4
Hewing, clearing and lopping for discharge trench and navigable Trench 1 Chain broad, at the rate of 37 acres à <i>fl.</i> 70	„ 2,590.— „	215 16 8
40 Chains Blinder-Trench (firm ground), 3 feet wide 4 feet deep à 40 cents of 12 feet length and 1 foot deep	„ 320.— „	26 13 4
40 Chains Fire-Trench (firm ground), 12 feet and wide and 3 feet deep, à <i>fl.</i> 1.— for 12 feet length, 1 foot depth	„ 520.— „	43 6 8
40 Chains catch-water drain, 6 feet broad 3 feet deep, à 50 cents for 12 feet length and 1 foot depth	„ 260.— „	21 13 4
<i>Carry over.</i> . . <i>fl.</i> 4,250.— „		384 3 4

		£	s.	d.
<i>Carried over</i>	<i>fl.</i> 4,250.—	384	3	4
125 Chains Navigable Trench, 12 feet broad and 8 ft deep à <i>fl.</i> 1.— for 12 ft length and 1 ft. depth	„ 3,600.—	300	0	0
250 Chains for two discharge Trenches, 10 ft broad and 6 ft deep, à <i>fl.</i> 1.— for 12 ft l. and 1 ft d.	„ 7,500.—	625	0	0
Working ground backwards, levelling etc. about	„ 3,325.—	277	1	8
Grubbing up stumps, about	„ 600.—	50	0	0
40 Chains Delph, 2 ft deep, 8 ft broad à 50 cents for 12 ft length and 1 ft depth.	„ 200.—	16	13	8
40 Chains heightening of bank or dike and smoothing.	„ 300.—	25	0	0
Unforeseen Expenses	„ 400.—	33	6	8
Together	<i>fl.</i> 20,175.—	1681	5	0

PART II.

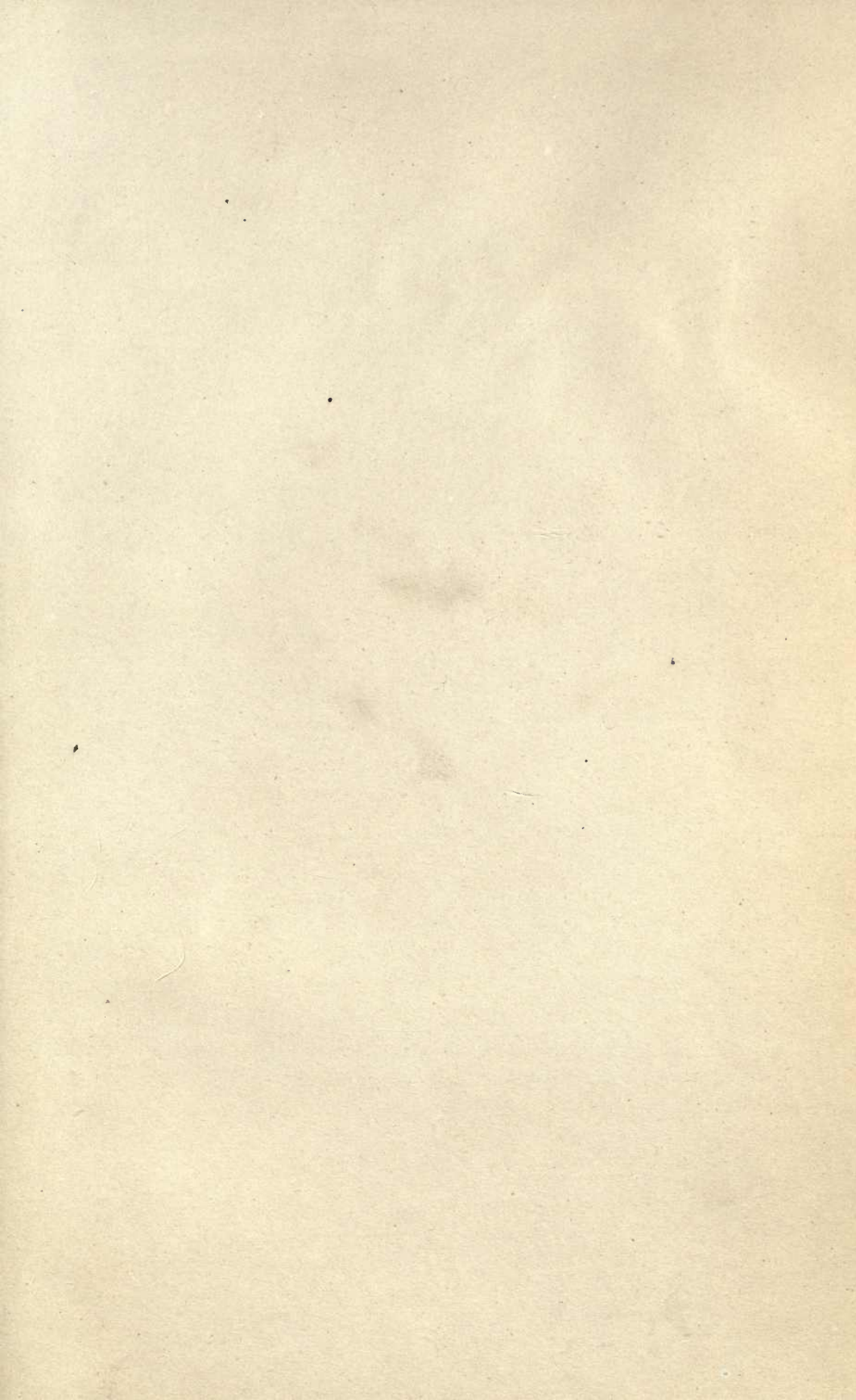
15 Acres Kapperwerie, felling, lopping, clearing à <i>f</i> 60.— per acre	<i>fl.</i> 900.—	75	0	0
23 15 Chains Small Frenches à <i>f</i> 6.— 1 ft deep „	138.—	11	10	0
10 » Middle Drain, 4 ft. broad, 3 ft. deep, for 12 feet length, and 1 ft depth à 20 cents	„ 33.—	2	15	0
10 Chains Delph (as before)	„ 33.—	2	15	0
15 Chains Side drain, 4 ft broad and 5 ft deep for 12 ft length and 12 ins. deep à 20 cents „	49.50	4	2	6
Levelling the ground for Drains and Trenches about	„ 125.—	10	8	4
1000 Bananaplants à 5 Cents	„ 500.—	41	13	4
<i>Carry over</i>	<i>fl.</i> 4,250.—	354	03	4

		£	s.	d.
<i>Carried over . . fl.</i> 21,953.50 = 1829 9 2				
Fetching and transporting said plants, distance one tide „	18.— „	1	10	0
Holing for 1000 Bananas à 2 cents . . „	200.— „	16	13	4
Planting 1000 » à 1 cent . . „	100.— „	8	6	8
Distributing 1000 young plants à 1 cent „	100.— „	8	6	8
Transporting young plants from the sluice to the field, a distance of 150 chains, at the rate of 80 cents per 600 plants . „	13.40 „	1	2	4
Weeding 7 times 12 at 80 cents per acre „	1,028.— „	85	13	4
Stamping down ground about young Bananas „	20.— „	1	13	4
Purchase of 1000 Cacao nuts à 5 cents. „	50.— „	4	3	4
Cacao Plants „	15.— „	1	5	0
Cassave-sticks, cutting and sticking them (as marks) „	24.— „	2	0	0
Maintenance of the Cacao and filling up the vacancies, about. „	80.— „	6	13	4
Cutting down young plants and planting of shade-trees „	25.60 „	2	2	8
Laying out two Beds of Seedlings and purchase of Cacao-nuts therefore . . . „	20.— „	1	13	4
Grubbing up stumps, about „	30.— „	2	10	0
Unforeseen Expenses. „	200.— „	16	13	4

Total *fl.* 23,877.50 = 1989 15 10

To which must be added 10 % commission for Contractors.

Paramaribo, 1 December 1884.



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